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| 10/542,065 | 07/11/2005 | Takahiro Fukuoka | 052780 | 2841 |

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| EXAMINER |
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HON, SOW FUN

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| ART UNIT | PAPER NUMBER |
|----------|--------------|

1772

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 01/24/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | | |
|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/542,065 | Applicant(s) FUKUOKA ET AL. | |
| | Examiner Sow-Fun Hon | Art Unit 1772 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Withdrawn Rejections

1. The obviousness-type double patenting rejection of claims 1, 3, 7-11, 13-14 over SN 10/542,017 in view of US 6,099,758, is withdrawn due to Applicant's amendment of the present application, dated 10/30/06, and Applicant's amendment of the copending application, '758, dated 11/06/06.
2. The objections to claims 9-12, 15-16 are withdrawn due to Applicant's amendment dated 10/30/06.
3. The 35 U.S.C. 102(b) and 103(a) rejections of claims 1-3, 5-16 are withdrawn due to Applicant's amendment dated 10/30/06.

New Rejections

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 7-10, 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Verrall (US 6,099,758) in view of Li (US 5,691,789).

Regarding claim 7, Verrall teaches a manufacturing method for a broadband cholesteric liquid crystal film (column 2, lines 1-5, film, column 1, lines 59-62) comprising steps of: polymerizing a liquid crystal mixture containing a polymerizable mesogen compound (a), a polymerizable chiral agent (b) and a photopolymerization

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initiator (c) between two substrates (polymerization initiator, polymerized by exposure to actinic radiation, abstract, photoinitiator, column 27, lines 49-54) with ultraviolet light (column 27, lines 49-54), wherein the liquid crystal mixture is free of an ultraviolet absorbent (polymerizable mixture of example 1, column 31, lines 44-50, the following polymerizable mixture is formulated, column 30, lines 29-67). Verrall teaches that the broad band cholesteric liquid crystal film (column 2, lines 1-5, film, column 1, lines 59-62) has a reflection bandwidth of at least 200 nm (column 4, lines 21-23) which is the same as 200 nm or more, wherein a pitch length in the cholesteric liquid crystal film changes so as to narrow continuously from a side (increases from a smaller value at one edge of the film to a higher value at the opposite edge of the film, column 4, lines 27-32). Verrall fails to disclose that the manufacturing method is set up so that the pitch length narrows continuously from the side irradiated with ultraviolet light, or that the pitch length is changed such that the difference in pitch length between the side of ultraviolet light irradiation and the opposite side is made at least 100 nm.

However, Li teaches a manufacturing method for a broadband (column 1, lines 5-10) cholesteric liquid crystal film (polymer having cholesteric order, column 1, lines 10-12) wherein a pitch length in the liquid crystal film changes so as to narrow continuously from a side irradiated with ultraviolet light, and the pitch length is changed such that the difference in pitch length between the side of ultraviolet light irradiation and the opposite side is made at least 100 nm (Fig. 5), for the purpose of providing a larger bandwidth (approaching 2,000 nm, column 4, lines 40-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have narrowed the pitch length continuously such that the difference in pitch length between the side of ultraviolet light irradiation and the opposite side, is made at least 100 nm, in the manufacturing method for broad band cholesteric liquid crystal film of Verrall, in order to provide the desired broad bandwidth, as taught by Li.

Regarding claim 17, Verrall teaches that the polymerizable mesogen compound (a) has one polymerizable functional group (column 12, lines 31-45) and that the polymerizable chiral agent (b) can have two or more polymerizable functional groups (column 11, lines 52-56).

Regarding claim 18, although Verrall fails to disclose the molar absorption coefficient of polymerizable mesogen compound (a), let alone that it is 50 to 500 $\text{dm}^3 \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$ at 365 nm, examples (Ia) and (Id) of Verrall contain a conjugated structure of three aromatic rings, and Applicant's example also contains a conjugated structure of three aromatic rings (original claim 6), which absorb in the ultraviolet range which encompasses the 365 nm wavelength. Thus, the polymerizable mesogenic compound (a) of Verrall is expected to have a molar absorption coefficient within the claimed range of 50 to 500 $\text{dm}^3 \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$ at 365 nm.

Regarding claim 8, Verrall teaches a circularly polarizing plate (the light incident on the reflective polarizer is transformed into circularly polarized light, column 9, lines 65-67) comprising a broad band cholesteric liquid crystal film (column 2, lines 1-5, film, column 1, lines 59-62) wherein the broad band cholesteric liquid crystal film is obtained

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by polymerizing a liquid crystal mixture containing a polymerizable mesogen compound (a), a polymerizable chiral agent (b) and a photopolymerization initiator (c) between two substrates (polymerization initiator, polymerized by exposure to actinic radiation, abstract, photoinitiator, column 27, lines 49-54) with ultraviolet light (column 27, lines 49-54), wherein the liquid crystal mixture is free of an ultraviolet absorbent (polymerizable mixture of example 1, column 31, lines 44-50, the following polymerizable mixture is formulated, column 30, lines 29-67). Verrall teaches that the broad band cholesteric liquid crystal film (column 2, lines 1-5, film, column 1, lines 59-62) has a reflection bandwidth of at least 200 nm (column 4, lines 21-23) which is the same as 200 nm or more, wherein a pitch length in the cholesteric liquid crystal film changes so as to narrow continuously from a side (increases from a smaller value at one edge of the film to a higher value at the opposite edge of the film, column 4, lines 27-32). Although Verrall fails to disclose that the pitch length in the cholesteric liquid crystal film changes so as to narrow continuously from the side irradiated with ultraviolet light, the film product, as presently claimed, is the same. Even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. See MPEP 2113. Verrall fails to teach that the pitch length is changed such that the difference in pitch length between the two sides is made at least 100 nm.

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However, Verrall teaches that the reflection bandwidth of the broadband film is very particularly preferably larger than 400 nm (column 8, lines 25-27), and that when the pitch changes, the bandwidth is broadened (column 1, lines 41-48). Thus, it would have been obvious to one of ordinary skill in the art to have optimized the process of making the broadband film to provide a difference in pitch length between the two sides of the film, of at least 100 nm, for the purpose of broadening the bandwidth, as evidenced by Li.

Li teaches a broadband (column 1, lines 5-10) cholesteric liquid crystal film (polymer having cholesteric order, column 1, lines 10-12) wherein a pitch length in the liquid crystal film changes so as to narrow continuously from a side irradiated with ultraviolet light, and the pitch length is changed such that the difference in pitch length between the side of ultraviolet light irradiation and the opposite side is made at least 100 nm (Fig. 5), for the purpose of providing the desired broad bandwidth (approaching 2,000 nm, column 4, lines 40-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a difference in pitch length between the two sides of the broad band film of Verrall, of at least 100 nm, in order to provide the desired broad bandwidth, as evidenced by Li.

Regarding claims 8-9, 13-16, Verrall teaches a linear polarizer (create linearly polarized light, column 8, line 54) comprising the circularly polarizing plate and a $\lambda/4$ plate (converts circular polarized light to linear polarized light, column 8, lines 60-63) laminated on the circularly polarizing plate (laminating QWF and the reflective polarizer

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together, column 9, line 5). Verrall teaches a luminaire (illumination, column 10, lines 8-15) comprising the circularly polarizing plate (inventive reflective polarizer 14, column 10, lines 51-52), which is part of the linear polarizer (reflected light redirected onto the reflective polarizer 14, converted by QWF 15 and compensation film 16 into linear polarized light, column 10, lines 63-66) on a front surface side of a surface light source having a reflective layer on the back surface side thereof (backlight unit 11 with a lamp 12 and a combined light guide and reflector 13, column 10, lines 50-52); and a liquid crystal display (device 10, column 10, lines 49-50) comprising a liquid crystal cell (18, column 10, lines 55-56) on a light emitting side of the luminaire (viewer 20, column 11, line 3); in Fig. 1 shown below.

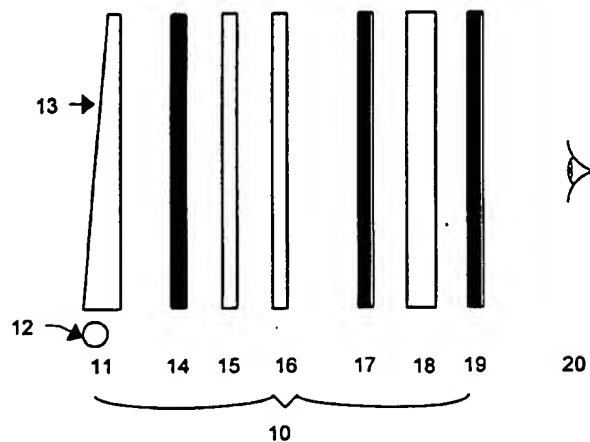


FIG. 1

Regarding claim 10, Verrall, as evidenced by Li, fails to teach that that the circularly polarizing plate is laminated on the $\lambda/4$ plate so that a pitch length in the film is narrowed toward the $\lambda/4$ plate continuously.

However, Verrall teaches that the liquid crystal mixture is coated and cured directly on the $\lambda/4$ plate which serves as a substrate (column 9, lines 7-10), and that the substrate can function as a polymerization inhibitor, wherein the short pitch is on the side of the film towards the substrate with the smaller inhibiting effect if the other side of the film encounters a greater polymerization inhibitor (column 5, lines 45-53). Thus Verrall teaches that laminating the circularly polarizing plate on the $\lambda/4$ plate so that a pitch length in the film is narrowed toward the $\lambda/4$ plate continuously for the purpose of providing the desired viewing effect, is well known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have laminated the circularly polarizing plate on the $\lambda/4$ plate so that a pitch length in the film is narrowed toward the $\lambda/4$ plate continuously, in the linear polarizer of Verrall as evidenced Li, in order to provide the desired viewing effect, as taught by Verrall.

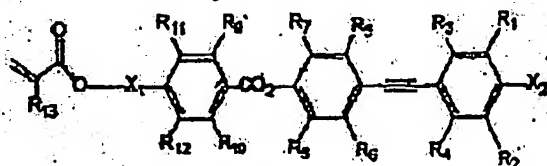
5. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Verrall in view of Li as applied to claims 7-10, 13-18 above, and further in view of Nakano (Abstract, formulae, JP2002308832).

Verrall in view of Li teaches the manufacturing method for a broad band cholesteric liquid crystal film comprising steps of: polymerizing a liquid crystal mixture that is free of an ultraviolet absorbent, containing a polymerizable mesogen compound

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(a), a polymerizable chiral agent (b) and a photopolymerization initiator (c) between two substrates with ultraviolet light, wherein the broad band cholesteric liquid crystal film has a reflection bandwidth of 200 nm or more, a pitch length in the cholesteric liquid crystal film changes so as to narrow continuously from a side irradiated with ultraviolet light, and the pitch length is changed such that the difference in pitch length between the side of ultraviolet light irradiation and the opposite side is made at least 100 nm. Verrall in view of Li fails to teach that the polymerizable mesogen (a) is a compound represented by Applicant's formula (1).

However, Nakano teaches that the polymerizable liquid crystal compound shown below, has large birefringence and is easily oriented (large $\Delta n/n$, abstract) to form an optical film (title of abstract).

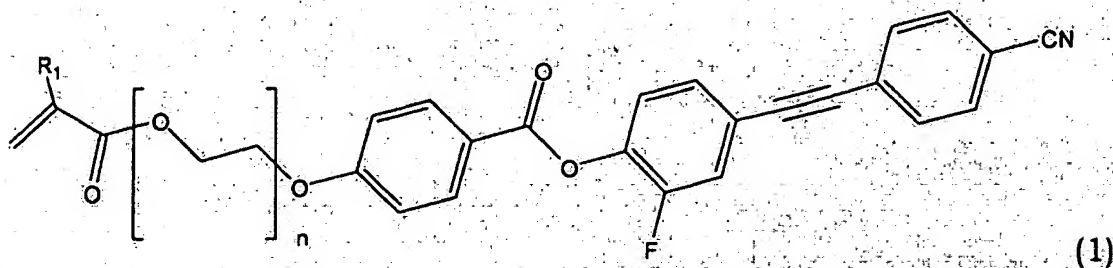


($R_1 \sim R_{12}$ は同一でも異なっても良く、 $-F$ 、 $-H$ 、 $-CH_3$ 、 $-C_2H_5$ または $-OCH_3$ 、 R_{13} は $-H$ または $-CH_3$ 、 X_1 は
 $X_1: -(CH_2CH_2O)_a(CH_2)_b(O)_c-$
 (a は0~3の、 b は0~12の整数、 c は0または1

を示し、 $a=1 \sim 3$ の時 $b=0$ 、 $c=0$ であり、 $a=0$ の時 $b=1 \sim 12$ 、 $c=1$ である。)を、 X_2 は $-CN$ または $-F$ を示す。)

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$R_{13} = R_1$ of Applicant = hydrogen atom or methyl group (CH_3), $X_1 = (\text{CH}_2\text{CH}_2\text{O})$, $a = n$ of Applicant = 1, $R_1\text{-}R_7$, $R_9\text{-}R_{12} = \text{H}$, $R_8 = \text{F}$, $X_2 = \text{CN}$ (formula on front page of Japanese patent). See Applicant's formula (1) shown below.



wherein R_1 represents a hydrogen atom or a methyl group, and n is an integer of 1 to 5.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a polymerizable liquid crystal compound represented by Applicant's formula (1) as a component of the polymerizable mesogen compound (a) in the manufacturing method for the broad band film of Verrall in view of Li, in order to provide a broad band cholesteric liquid crystal film with the desired large birefringence and ease of orientation provided by the polymerizable mesogen compound of Applicant's formula (1), as taught by Nakano.

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Verrall in view of Li, as applied to claims 7-10, 13-18 above, and further in view of Cobb (US 6,515,785).

Verrall in view of Li, teaches the linear polarizer comprising the circularly polarizing plate comprising the broad band cholesteric liquid crystal film, and a $\lambda/4$ plate laminated on the reflecting circularly polarizing plate, as described above. Verrall in

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view of Li, fails to teach that the linear polarizer further comprises an absorption polarizer adhered to the linear polarizer let alone that a transmission axis direction of the absorption polarizer and a transmission axis of the linear polarizer are arranged in parallel with each other.

However, Cobb teaches an absorbing polarizer and a reflecting polarizer laminated together and aligned for highest transmission (column 12, lines 38-46), which is when the transmission axis of the absorption polarizer (802, column 17, lines 44-46) and the reflecting polarizer (801, column 17, lines 52-53) are arranged in parallel with each other (801 is rotated to an orientation in which its transmission axis is parallel to the transmission axis of 802, column 59-62), for the purpose of providing enhanced contrast with the highest transmission (column 12, lines 30-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have adhered an absorption polarizer to the reflecting linear polarizer of Verrall in view Li, wherein a transmission axis direction of the absorption polarizer and a transmission axis of the linear polarizer are arranged in parallel with each other, in order to provide enhanced contrast with the highest transmission, as taught by Cobb.

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Verrall in view of Li, as applied to claims 7-10, 13-18 above, and further in view of Kameyama (US 6,088,079).

Verrall in view of Li, teaches the linear polarizer comprising the circularly polarizing plate comprising the broad band cholesteric liquid crystal film, and a $\lambda/4$ plate

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laminated on the circularly polarizing plate, as described above. Verrall in view of Li, fails to teach that the $\lambda/4$ plate has a N_z coefficient defined by formula $(n_x - n_z)/(n_x - n_y)$ which is within the range of -0.5 to -2.5 when the in-plane major refractive indices are n_x and n_y respectively and the major refractive index in the direction of thickness is n_z .

However, Kameyama teaches a $\lambda/4$ plate (quarter-wavelength plate, column 10, line 16) with a N_z coefficient defined by formula $(n_x - n_z)/(n_x - n_y)$ of -0.2 to -1.2 (column 10, lines 18-24), which overlaps the claimed range of -0.5 to -2.5 , wherein n_x and n_y are the in-plane major refractive indices respectively, and n_z is the major refractive index in the direction of thickness, by convention, wherein the specific range of N_z values are for the purpose of improving viewing angle characteristics by compensating for the color change with changing viewing angle (column 10, lines 14-16).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the $\lambda/4$ plate of Verrall in view of Li, with a N_z coefficient defined by formula $(n_x - n_z)/(n_x - n_y)$ which is within the range of -0.5 to -2.5 , in order to improve viewing angle characteristics by compensating for the color change with changing viewing angle, as taught by Kameyama.

Response to Arguments

8. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number is (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached at (571)272-1498. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Hon

Sow-Fun Hon

01/19/07

RENA DYE

RENA DYE
SUPERVISORY PATENT EXAMINER

Teach Center 1700